The knowledge-based bioeconomy as a driver of sustainable internationally competitive agricultural sphere of Ukraine

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Ukraine as an agrarian country has a unique natural, social and economic potential:

- Agricultural lands account for 71.2% of its territory and holds 24.6% of all black earth soil
- One fifth of labor is engaged in agriculture

Throughout the year 2015, the volumes of capital investments in agriculture, forestry, and fisheries have amounted to 27,9 billion UAH, 27,1% more than in the previous year, and this trend occurred at the background of general decrease of capital investments in the country’s economy by 1,7% and specifically, in the industry by 20%.

The capital investments in agriculture have increased by 26,1%, in the forestry – 1,7 times, and in the fisheries – 2,5 times.
Strengths and Opportunities for the Development of Agricultural Sector of Ukraine

- **Advantages** for the development of agriculture in Ukraine include a favorable climate, nearly 30 million hectares of agricultural land, one of the highest land fertility levels in the world, and a geographic location at a crossing point of global trade routes.

- **Ukraine as the "granary of Europe"** harvested 63.8 million tonnes of grain in 2014 and exported about 30 million tonnes in the 2014/15 season.

- **Ukraine is number one worldwide** in sunflower oil and seed exports, number three in grain exports and number seven in poultry exports. That is why Ukraine was, is and will be very important for global food safety and security and plays a very active role worldwide in food balance.
Strengths and Opportunities for the Development of Agricultural Sector of Ukraine

- Diversification trend of Ukrainian products’ supplies: Ukraine exports to 190 countries. The major markets are the Asian (nearly $6,7 billion of export), the European ($ 4,1 billion) and the African ($ 1,9 billion) markets.

- The permit for export of Ukrainian products to the EU is very significant but also is featured by very different quality standards. For example, these standards provide for the analysis of all entire production chain in the dairy industry. As for today 10 % Ukrainian companies have already received the European certificates. It means, that additionally to the export to Europe, Ukraine received great prospects for exporting to the Asian and African markets.
Weaknesses and Barriers to the Development of the Ukrainian Agricultural Sector

- The rate of ploughed lands in Ukraine is the highest in the world. It has already reached 56% of Ukrainian territory and 80% of all arable land. Therefore, despite significant resource potential, the effectiveness of land use in Ukraine is significantly lower than the average effectiveness ratio in Europe. Intensive agricultural use results in decreased fertility due to overcultivation (especially black earth soil), loss of crumble structure and drainage properties, etc.

- Only 17.4% of Ukraine is covered with all types of forests. This is the lowest level in Europe, where forests generally account for 28-32% of a country’s territory.
Weaknesses and Barriers to the Development of the Ukrainian Agricultural Sector

- Domestically produced machinery generally does not comply with world standards and requires radical modernization. In Ukraine – due to the use of outdated energy intensive technologies – energy consumption during agricultural production is several times higher compared to developed economies.

- Insufficiently close interaction between agrarian science and applied agricultural production; weak relationships with leading international agrarian scientific institutions, as well as weak contacts with leading international companies and their experience with new technologies. At the same time, the poor economic and technological state of agro-industrial production decreases demand for scientific R&I.
Bioeconomy as a driver of sustainable internationally competitive agricultural sphere of Ukraine

The above problems and barriers also correlate with major challenges faced by the agrarian and research communities in other countries of the world. To address these challenges, researchers should combine their intellectual efforts through joint programs and collaborative projects within international cooperation.

The knowledge-based bioeconomy strategy proposes a comprehensive approach to address the ecological, environmental, energy, food supply and natural resource challenges that Europe and indeed the world are facing already today.
The Bio-Economy

The term “bio-economy” comprises those parts of the economy that use renewable biological resources from land and sea – such as crops, forests, fish, animals and micro-organisms – to produce food, materials and energy.

Managed in a sustainable manner, bioeconomy can also:

- sustain a wide range of public goods, including biodiversity and ecosystem services;
- reduce the environmental footprint of primary production and the supply chain as a whole increase competitiveness;
- enhance Europe's self-reliance, and provide jobs and business opportunities.
XXI – a century of bioeconomy
The Bio-Economy

The European bio-economy has an approximate market size with an annual turnover of around two trillion euros and employing around 22 million people, it is already one of the Union’s biggest and most important sectors encompassing agriculture, forestry, fisheries food and chemicals.

The bioeconomy is therefore not a niche area – it is about growth and jobs

Bioeconomy can contribute to build a more competitive, innovative and prosperous Europe.
A new world of Bioeconomy
Life Sciences and Biotechnology in convergence with other technologies, provides the knowledge-base for the sustainable management, production and use of biological resources, provides new, safe, affordable and eco-efficient products, supports competitiveness and sustainability of major European industries.

Examples:

Advances in diagnostics have increased food safety and control of animal diseases (foot and mouth; BSE)

Use of enzymes in industrial and household processes (washing powder), and in food production, have strongly reduced energy/water consumption and led to new “functional” foods.
What are the driving forces behind the Knowledge-Based Bio-Economy beyond competitiveness?

- Secure a sustainable agriculture and fisheries production for a rising world population, on limited arable land and facing impacts of climate change;
- Secure the demand for renewable bio-resources for eco-efficient products and biofuels;
- Serve public health through safer, healthier and higher quality foods;
- Control and prevent epizootic and zoonotic diseases like avian flu, and food related disorders, such as obesity.
What is the Knowledge-Based Bio-Economy offering?

The Bioeconomy – a solution for complex and interconnected challenges

- **Improved health**
  
  Food with improved nutritional value, increased food safety, new treatments, diagnosis and vaccines against human and animal diseases, improved feed...

- **Sustainability and a cleaner environment**
  
  Energy and water saving production and processes in agriculture and industry; decreased dependence of fossil resources;

- **Support to rural development**
  
  Use of “set-aside” land; cultivation of new crops; decentralised production facilities

- **Increased industrial competitiveness through innovative eco-efficient bio-based products**
Knowledge Based Bio-Economy: Where are we?

**FP6 (2002-2006):** Creation of 7 Technology Platforms relevant to the KBBE; a number of relevant ERA-NETs projects; KBBE stakeholder conference (Sep 2005)

**FP7 (2007-2013):** Theme «Food, Agriculture and Biotechnology» to support the KBBE (1,935 billion €)

**Horizon 2020 (2014-2020):** SC 2 “Food Security, Sustainable Agriculture and Forestry, Marine, Maritime and Inland Water Research and the Bioeconomy” (3,851 billion €)
Advancing the bio-economy

Estimates show that just in terms of the EU’s investment in bioeconomy research and innovation, each euro to be invested under the proposed Horizon 2020 programme for research and innovation could generate ten euros of added value in the different bioeconomy sectors by 2025.

On 13 February 2012, the European Commission adopted the strategy "Innovating for Sustainable Growth: A Bioeconomy for Europe".

The EC works on ensuring a coherent approach to the bioeconomy through different programmes and instruments including the Common Agricultural Policy, the Common Fisheries Policy, Horizon 2020, European environmental initiatives, the Blue Growth initiative for the marine sector and the European Innovation Partnership on Sustainable Agriculture.
Ukrainian agrarian science has sufficient scientific and technical potential to generate scientific and technical results that are required to accelerate the transition of the agro-industrial complex with an innovative development model. This scientific and technical potential is represented by 258 scientific institutions of the National Academy of Agrarian Sciences of Ukraine (NAASU): 11 institutes of the National Academy of Sciences of Ukraine (NASU) with biological, chemical, physical, technical, and economic profiles and 95 educational institutions and R&D institutions under the Ministry of Agrarian Policy and Food and the Ministry of Education and Science of Ukraine. In Ukraine scientific and research activity of agricultural scientific institutions is carried out on more than 100 thousand hectares of land, and nearly 800 scientific and research chairs/department co-operate directly with agricultural enterprises.
The most successful biotechnologies used in Ukraine are bio-fuels, specifically bio-ethanol and bio-methane; waste biodegradation and removal; virus-free cultivation of planting stock in vine- and hop-growing; probiotics; as well as biopharmaceutical and gene-engineering diagnostic products. Strategic areas for the development of biotechnology include environmental restoration and recycling using live systems; biological restoration and purification of water; energy efficiency using biological processes; cell and gene technologies to create new medical drugs and agricultural products; biologically active compounds of a natural origin to develop new pharmaceuticals; methods for cellular and gene therapy, etc. Significant attention is paid to the development of diagnostic test systems, methods for diagnosing diseases and developing corresponding vaccines; technologies for obtaining biologically active substances using strains producers; enzymatic agents for industry; microbial fermentations for the food industry; biosensors for monitoring the environment, etc.
Perspective Areas of S&T Cooperation between the European Union and the Black Sea Region:

- Development of microbial technologies and R&D in biofuel production (low-molecular alcohols, methane and hydrogen) from organic waste - different modifications of the biotechnology showed high efficiency towards transforming waste to energy mixed solid vegetable waste etc.

- Genomic approaches for efficient use of traditional European oil plant potential for food (feed) and biodiesel production
Perspective Areas of S&T Cooperation between the European Union and the Black Sea Region:

- Resolving of global food security challenges through development of cereal varieties resistant to devastating diseases
- Improving microbial plant secondary metabolite production as food additives and compounds of functional products
- Exploration of plant and fungal cytoskeleton: a key tool for genomics and agro-biotechnology
Perspective Areas of S&T Cooperation between the European Union and the Black Sea Region:

- Promotion of the knowledge-based Bioeconomy development in creating and supporting the network of agro-innovation structures within the BS Region

The project topic is a systematic attempt to bring the emerging concepts of agro-innovation structures to the Cross-border territories and to build sustainable partnerships between countries of the BS region. Transfer of experiences within the BS region, along with analysis of the strengths and opportunities of the Cross-border cooperation and massive networking and communication will be the main tools that will be deployed as the primary means to achieve this awareness and unleash this new development and co-operation potential.
Specific International Cooperation Actions (SICA)

- more participants required for SICA Projects
- 4 different MS or AC + 2 different ICPC
- Ukraine – among others – will be considered as a region
- ≥ 2 partners can be located in Ukraine
- partners have to come from different regions, republics

Thank you!

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